Popular Dietary Supplements Help or Hype?

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Prevalence of Use

- 59% take supplements regularly
- 46% take multiple vitamin/mineral
- 35% take single vitamins
- 15% take herbs
- 8% take specialty supplements (SAM-e, glucosamine)

2001 Harris Survey

Reasons for Use

Improved health and well being:

- Feel better = 72%
- Prevent illness = 67%
- Treat illness = 51%
- Live longer = 50%
- Increase muscle mass = 37%
- Weight management = 12%

Reasons for Use

Other:

- Specific health reason = 36%
- Sports nutrition = 24%
- Recommended by doctor = 33%

2001 Harris Survey;
www.supplementinfo.org

Knowledge of Supplements

Many don’t understand supplement action:

- 58% indicate calcium only needed by postmenopausal women
- 41% indicate primary reason for iron is to increase energy

92% consult physician regarding Rx drugs

49% consult physician regarding supplements

Supplement Sales
Nutrition Business Journal

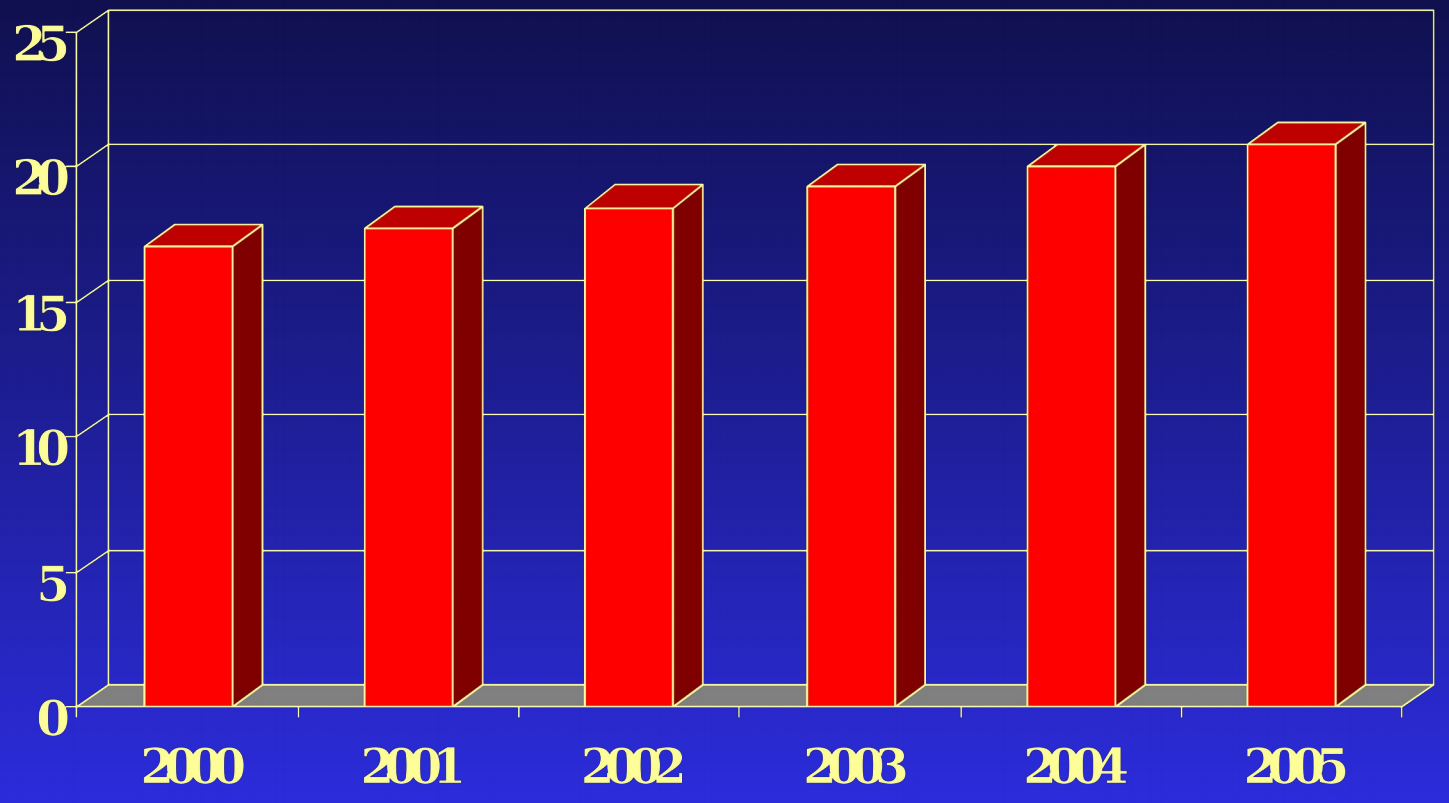
Exceeded $16.8 billion in 2000;

1/3 of $49.5 billion US nutrition industry

- Vitamins = 35% market share
- Herbs = 25% market share
- Specialty = 10% market share
- Sports nutrition = 9% market share
- Minerals = 8% market share (Ca++ biggest)

U.S. Dietary Supplement Sales

Nutrition Business Journal



Sales in billions

Vitamins for Adults

- Elderly, vegans, alcoholics, and patients with malabsorption at higher risk of inadequate intake or absorption
- General population has suboptimal intake
- Low levels of folic acid, vitamin B6 and B12 are risk factor for CHD, neural tube defects, and colon and breast cancer

JAMA. 287:3116-3126, 2002

Vitamins for Adults

- Low levels of vitamin D contribute to osteopenia and fractures
- Low levels of antioxidant vitamins A, C, and E may increase risk of several chronic diseases
- “Pending strong evidence of effectiveness from randomized trials, it appears prudent for all adults to take vitamin supplements”

JAMA. 287:3127-3129, 2002

Popular Herbal Supplements

- Soy
- Green tea
- Valerian
- Saw palmetto
- Ephedra
- Guarana
- Black cohosh
- Milk thistle
- Grape seed extract
- Red clover

Nutrition Business Journal

Ephedrine

- CNS stimulant and decongestant
- Structurally similar to amphetamines
- Increases heart rate and blood pressure
- May promote body fat loss; improve anaerobic and aerobic performance
- Ma Huang, Ephedra Sinica, Sida Cordifolia contain ephedrine

Ephedrine

- Side effects: GI distress, dizziness, headache, irregular pulse, heart attack, stroke, seizure, psychosis and death
- Variable potency, poor quality control, banned substance

Caffeine

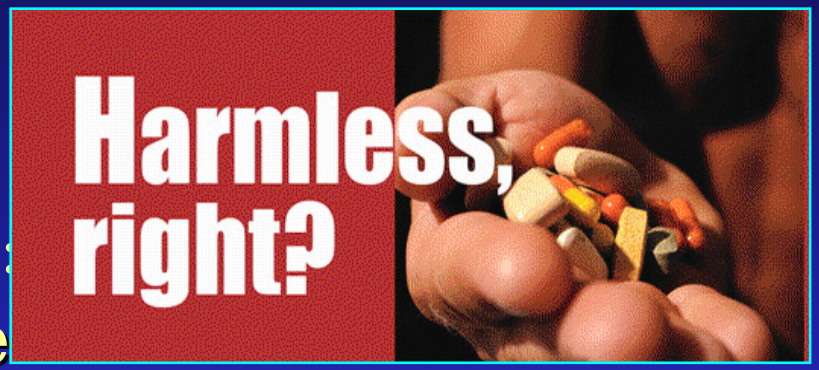
- CNS stimulant ↑ epinephrine levels
- 3 to 6 mg of caffeine/kg 1 hour before exercise may improve endurance
- Does not promote body fat loss
- Guarana, Kola nut, Mate, Red Bull, No-Doze, Vivarin contain caffeine

Caffeine

- Side effects: diuresis, nausea, muscle tremor, palpitations and headache
- Caffeine increases effects of ephedrine

ECA Stack

- ECA Stack is a popular performance and weight loss supplement
- Typical ingredients:
  30 mg of ephedrine
  100 mg of caffeine
  300 mg of aspirin



Synephrine

- CNS stimulant similar to caffeine and ephedrine
- Doesn’t appear to have same negative CNS effects as ephedrine
- Effectiveness for weight loss is over-stated; raises blood pressure in animals
- Citrus Aurantium contains synephrine

Green Tea Extract

- Mild thermogenic effect: high content of catechin-polyphenols (EGCG) + caffeine
- Catechin-polyphenols ↑ norepinephrine levels (↓ norepinephrine breakdown)
- Green tea extract (90 mg ECGC; 50 mg caffeine) ↑ energy expenditure by 4% and fat use compared to caffeine + placebo

Am J Clin Nutr.. 70:1040-1045, 1999

Grape Seed Extract

- Flavonoids (proanthocyanidins) potent anti-oxidants and free-radical scavengers
- May inhibit destruction of collagen structures; enhance blood vessel integrity
- In vitro and animal studies suggest reduced risk of cancer and cardiovascular disease

Black Cohosh

- Contains triterpene glycosides and appears to have an estrogen-like action
- Binds to estrogen receptors and suppresses luteinizing hormone
- Standardized extracts: positive effects on menopausal/post menopausal complaints

SAMe

- S-adenosyl-L-methionine donates methyl groups to proteins, nucleic acids, hormones neurotransmitters, membrane phospholipids
- May be helpful for the treatment of depression (by affecting neurotransmitters) and arthritis (by stimulating cartilage growth and repair)

Hardy et al. AHRQ. October 2002

Soy Isolfavones

- Isoflavones exert weak estrogenic activity
- May help treat menopausal symptoms
- Conflicting research whether isoflavones inhibit estrogen dependent breast cancer and reduce bone loss from osteoporosis
- May reduce risk of CHD by reducing LDL cholesterol and platelet aggregation

Milk Thistle

- Contains liver-protective substances collectively designated silymarin
- Silymarin blocks entry of toxic substances into liver cell membranes
- Stimulates protein synthesis; accelerates regeneration and production of new cells
- Germany: supportive treatment for toxic liver damage + inflammatory liver disease

Saw Palmetto

- Appears to have anti-inflammatory and mild antiandrogenic (anti-male hormone) effects
- Used for benign prostatic hypertrophy in Europe
- Relieves symptoms of enlarged prostrate; does not reduce enlargement

Echinacea

- Used to fight upper respiratory infections
- Increases number of immune cells in blood
- Enhances cell's ability to destroy harmful bacteria; inhibits replication of viruses
- Recent study: no benefit for treatment of cold

Ann Intern Med. 137:939-946, 2002

Kava

- Used to relieve stress, anxiety, and tension
- CNS depressant and has anesthetic effects
- Used as social drink in some cultures
- Associated with liver injury including hepatitis, cirrhosis, and liver failure

www.cfsan.fda.gov/~dms/addskava.html

Valerian

- Used to promote sleep due to mild sedating and tranquilizing effects
- Appears to depress brain centers and directly relax smooth muscle
- Documented CNS depressant activity may potentiate existing sedative therapy

St John's Wort

- Used to relieve depression; "herbal Prozac"
- Appears to increase serotonin
- Conflicting research whether helpful for depression; self-treating can be harmful
- Interacts with many drugs: ↓ effectiveness of cyclosporin, indinavir, digoxin, warfarin

JAMA. 287:1807-1814, 2002
JAMA. 286:208-216, 2001

Ginkgo

- Used to improve memory + concentration, especially in older people
- Promotes vasodilation; enhances blood flow
- May aid leg circulation in people with peripheral vascular disease
- May interact with Rx medications and supplements that thin the blood

JAMA. 286:208-216, 2001

Creatine

- Increases Cr and CP content in muscles
- May improve high-power performance ≤30 seconds and delay onset of fatigue
- Increases body mass by ~ 3 to 7 lbs
- Loading: 20-25 g/day for 5 to 7 days
- Maintenance: 2-5 g/day

Creatine

- Side effects: weight gain
- Athletes using creatine **must** drink adequate fluids
- Lack of long-term safety data

Med Sci Sports Exerc. 32:706-717, 2000

Creatine

- May alter balance and agility
- “Anabolic” products containing creatine may also contain banned substances

IOC Nutritional Supplements Study, 2002

Glucosamine

- Plays a role in maintenance and repair of cartilage
- Stimulates cartilage cells to synthesize cartilage building-blocks – glycoproteins and glycosaminoglycans
- May have anti-inflammatory action by inhibiting proteolytic enzymes that contribute to cartilage breakdown

Glucosamine

- Most effective for early arthritis, less for severe arthritis
- Appears safe, more research needed for effectiveness
- 1.5 g/day in divided doses

JAMA. 283:1469-1475, 2000
JAMA. 283:1483-1484, 2000

Protein

Requirements:

- Strength athletes:
  1.6 – 1.7 g/kg/day
- Endurance athletes:
  1.2 – 1.4 g/kg/day

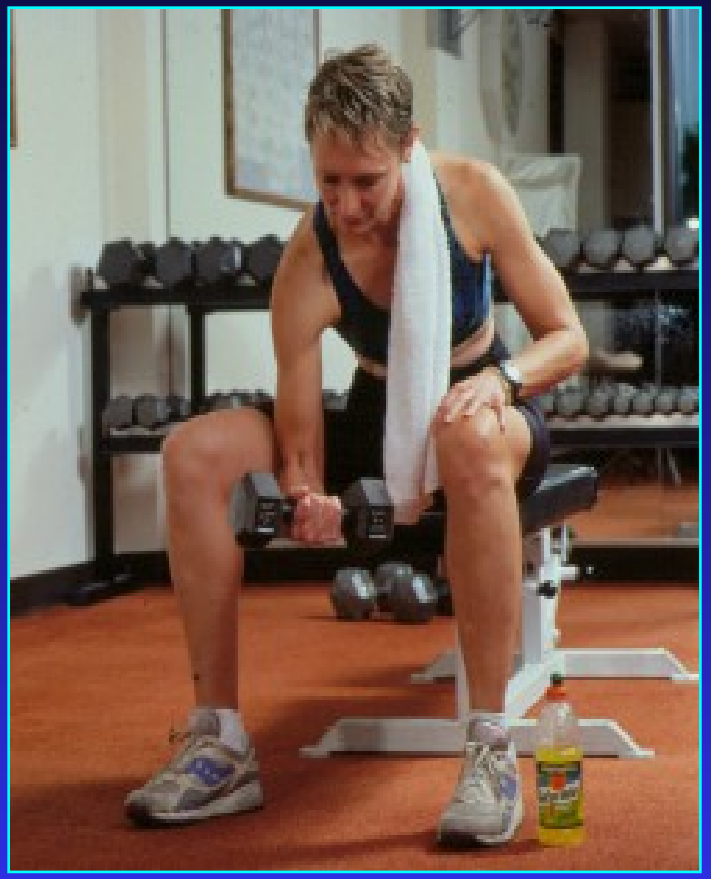
Protein

To gain 1 lb of muscle:

- 3,500 calories
- 100 g protein

To gain 1 lb in a week

- 500 extra calories per day
- 14 extra g protein per day

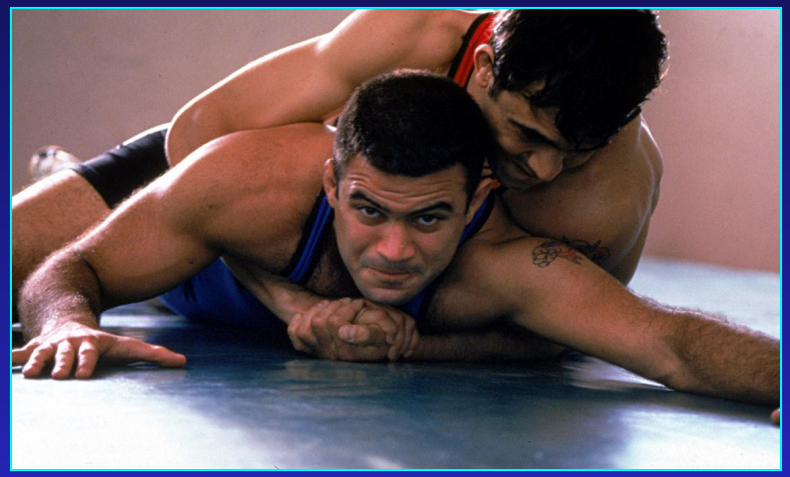


Protein

- Excess protein (over 2 g/kg/day) not incorporated into muscle – increases amino acid oxidation
- Adequate calorie intake = ample protein intake
- Protein supplements are convenient but not superior to dietary protein

“After testing positive for nandrolone, Fritz Aanes suffers two heartbreaks..”

- Lost the bronze medal
- Banned for two years from competition
- Protested drug test
- Denied taking steroids
- Lab confirmed dietary supplement contained nandrolone – not listed on label



Evaluating Supplements

- What claims are made for the product?
- What are the product's ingredients?
- Is the product safe?
- Is the product effective?
- Does the product contain substances banned by athletic organizations?
- Is the product affordable?

Choosing a Supplement

- Products that have USP (United States Pharmacopeia) on the supplement label
- Products eligible for ConsumerLab seal of approval – www.consumerlab.com
- Nationally known food and drug companies with tight manufacturing controls

Choosing a Supplement

- Supplement label should provide appropriate and accurate information
- Be wary if statements are unclear or label makes preposterous claims
- Avoid products with claims that sound too good to be true
- No dietary supplement can guarantee optimum performance or health

FDA – Evaluating Supplement Information on Internet

- Look for sites run by government, university, or reputable medical/health association
- Is site's purpose to educate or sell product?
- Is site's information supported by research and cited in PubMed?
- Think twice about chasing the latest headline: science advances by small steps and slowly building towards consensus

http://www.cfsan.fda.gov/~dms/ds-savvy.html

Final Thoughts

- By definition, a supplement is a substance to augment the diet
- Promote proven dietary strategies for athletic performance, weight loss, and health
- Educate consumers on potential benefits/risks of dietary supplements and lack of quality control